

Is Your Estimate Real?

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NASA PM Challenge at Daytona, Fla.

February 15, 2008

Is Your Estimate Real?

- **Answer**

- The amount of trust you have in the estimate at which you are looking is proportional to the detail of the logic and the use of valid math techniques

Is your Estimate Real?

- **The estimating world is made up of people doing price and cost analysis:**
 - Price Analysis is the comparison of a cost based on:
 - Catalog prices
 - Previous price history
 - Parametric methodologies
 - Cost Analysis is the creation of costs based on:
 - Bottoms up techniques
 - Analog techniques with or without Complexity Factors
 - Cost Estimating Relationships (CER)
 - Parametrics
 - Most analyses use data (including scope) to reach conclusions

Is Your Estimate Real? Who Does Them?

Defense Acquisition Process



Is Your Estimate Real?

Who Is Your Customer?

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- **Government**
 - Hundreds of levels and procuring agencies and their auditors
- **Industry**
 - User, prime, subcontractor
- **Company**
 - President/VP
 - Fiscal group
- **Group**
- **Performance individual**

Is Your Estimate Real?

Price and Cost Analysis Are Two Distinct Techniques



- **Price Analysis**

- A method that relies historical program or object prices to predict the future

- **Cost Analysis**

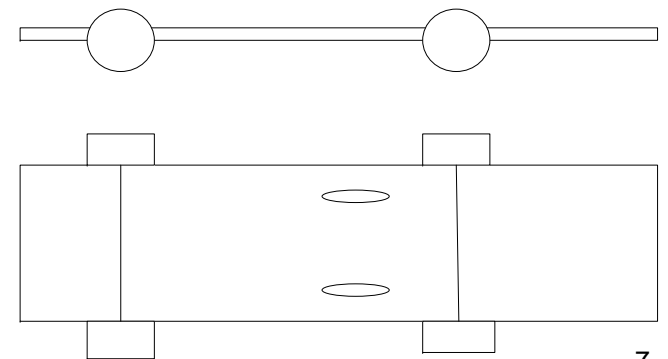
- A method that relies on historical process costs or done as a bottoms up

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Simple Example of Price Analysis

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- Store 1 Pair of Roller Skates \$18
- Store 2 Pair of Roller Skates \$11
- Store 3 Pair of Roller Skates \$17
- Catalog 1 Pair of Roller Skates \$12
- Store 4 Pair of Roller Skates \$25
- Store 5 Pair of Roller Skates \$39
- Compare Prices—If All Same Value Lowest Price Is Best Value



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Example of Cost Analysis

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Parts List

8 Wheels - \$1 ea = \$8

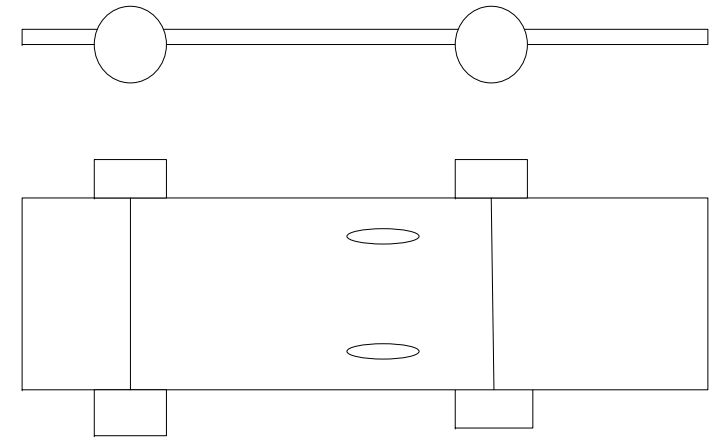
4 Axles - \$0.25 ea = \$1

2 Shoe Base - \$1ea = \$2

2 Straps With Buckle - \$1.50

Labor to Assemble - 1/2 hour x 10 \$/hr = \$5

Total per Pair Cost = \$17.50



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What Is the Phase of the Cost Estimate and Its Data?

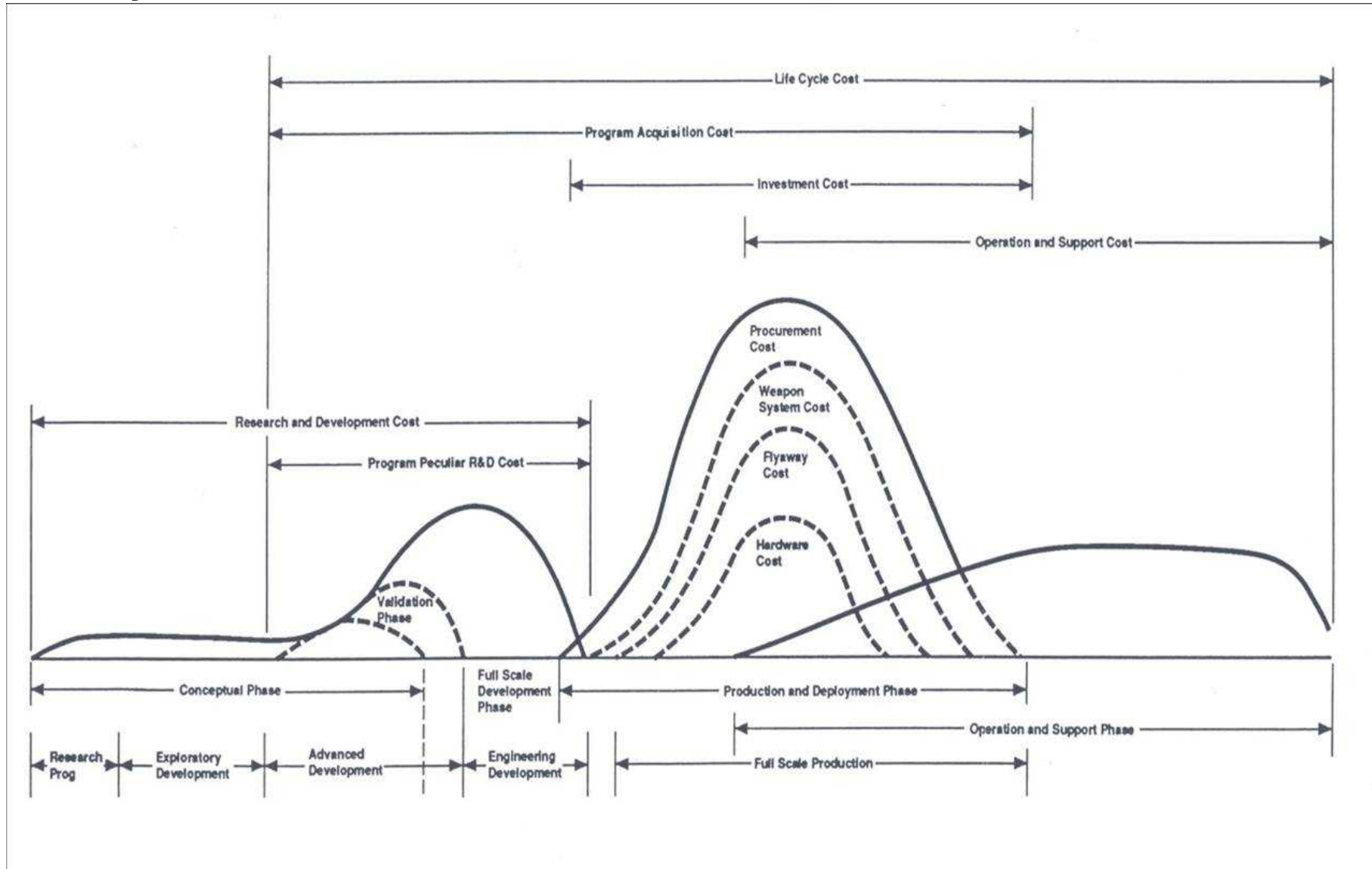
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- **No contracts are awarded based on life cycle cost although it may sometimes be a discriminator in selecting the product**
- **Most contracts are awarded based on development to reach a technical readiness level, cost for final design, and recurring production cost**
- **You must know the phase origins of your data**

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Life Cycle vs. Single Phase

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Selecting the Right Method for Your Estimate

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- **Models/Databases**

- Price based

- Parametric

- Hardware/ electronics/software based

- Catalog based

- Cost Based

- Analog or “similar to” with or without factors

- Bottoms up

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Bottoms-Up Types

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- **Published Labor Standards**
- **Expert Opinion**
- **Cost Estimating Relationships
(Statistical or Non-Statistical)**
- **Done Singular or in Groups**

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Method Used If You Have Data

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- **Price estimating**

- Price indices for inflation/deflation
 - Producer price indices by commodity groups
 - Escalation table services
- Cost, volume, profit analysis (fixed/variable costs)
- Product random sample analysis
- Best fit analysis $Y=a+bx$
- Least square—Best fit also called Regression

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More Price Analysis Techniques

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- **Factors from economic forecasts**
- **Cost Estimating Relationships (CER)**
 - Parametric-based on a performance parameter
 - Cost-to-cost or resource to resource
- **Improvement curves - $\text{Cost} = \text{TFU} (\text{unit}^B)$ where $B = \log \text{ of the slope (ie .9 for 90\%)} / \log \text{ of } 2$**
 - Applies to touch labor only—not LOE
 - Materials are usually a different curve than touch labor
 - Only valid where curve is continuous

Is Your Estimate Real?

How Is Your Data Organized?



- **WBS Cost Actuals**
 - Functional categories
 - Collection
 - Retrieval
- **Phase-Oriented CERs**
- **Scope Data**
 - Difficult to obtain
 - Databases—Flat file or relational (Codd's 12 rules)

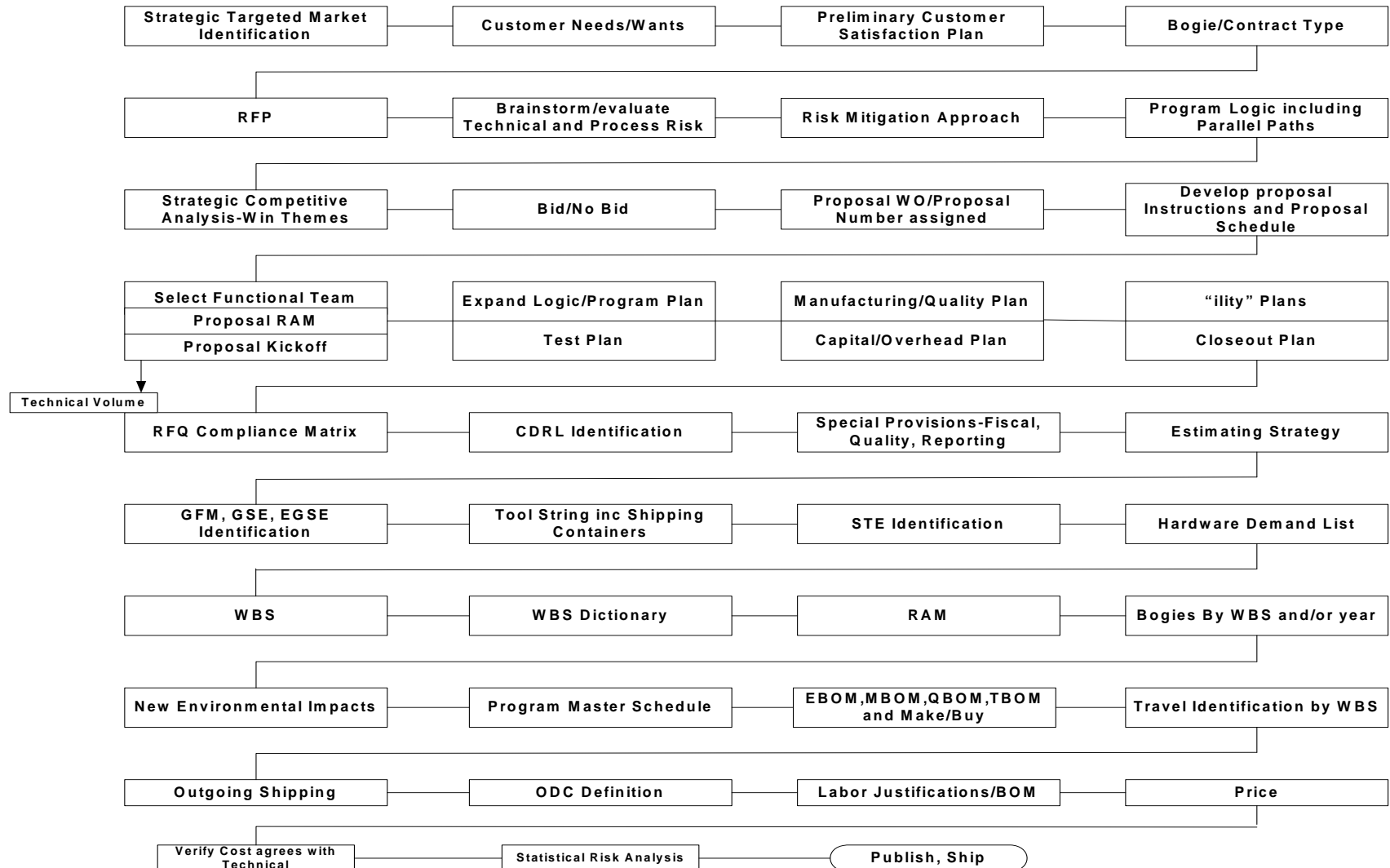
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- **Proposal estimating—process discipline is essential**
 - On a big proposal the proper sequence stops errors and “do overs”
 - Proposal process definition allows an assignee to each task with a deadline
- **Difference in techniques between a ROM and Firm**

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The Firm Cost Proposal Process



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ROMs by Other Names



- Rough Order of Magnitude
- High Fidelity ROM
- Budgetary Estimate
- Planning Number
- Wild Associated Guess (WAG)
- Briefing Number
- Shot in the Dark
- Guestimate
- But Never, Never a Not to Exceed (NTE)

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Example of a Bottoms-Up Cost Estimate



| | | | 0.324989 | 0.612 | | 0.44 | 0.335 | 7.48 | 0.018 | 0.057 | 0.81 | 0.135 | |
|-----|--------------------------|----|----------|--------|--------|------|-------|------|-------|----------|---------|---------|------|
| WBS | task | cf | eng-sh | mfg-sh | mfg-hh | q-sh | q-hh | y-sh | y-hh | q sh out | test-sh | test-hh | sum |
| | average cost of 18 units | | | | | | | | | | | | |
| 118 | Rocket Engine Stg 1 fram | 1 | 315 | 594 | 970 | 427 | 325 | 131 | 17 | 55 | 106 | 131 | 3071 |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

Assumes static test of each frame.

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Example of a Cost Estimate



| 2.106849 | | | | | | | | | | | | | |
|----------|----------|---------|-------|-------|------|------|-------|--------|-------|-------|--------|-------|--------|
| 16500 | 0.000954 | | 0.08 | 0.001 | 0.06 | 0.02 | 0.002 | | 3 | 0.064 | | 0.1 | 2007\$ |
| matl | proc-sh | proc-hh | pm-sh | pm-hh | f-sh | c-sh | c-hh | travel | odc | q-lab | cost | fee | price |
| | | | | | | | | | | | | 0 | 0 |
| 34763 | 33 | | 246 | 3 | 184 | 61 | 6 | | 10814 | 62.08 | 658450 | 65845 | 791456 |
| | | | | | | | | | | | 0 | 0 | 0 |
| | | | | | | | | | | | 0 | 0 | 0 |
| | | | | | | | | | | | 0 | 0 | 0 |
| | | | | | | | | | | | | | 791456 |

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Difference in Techniques Between a ROM and Firm

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- **Firm—Has labor, material, and 5 to 10 categories of ODC discretely estimated and priced.**
- **ROM—A similar previous program was done for \$20M in 2003 \$. This effort the same but is done in 2010. $20 \times 1.03^5 = \$23.2M$**

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What Type of Contract?

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- **Cost +**
- **Firm Fixed Price**
- **Fixed Price Incentive**
- **Cost Plus Incentive Fee**
- **Cost Plus Award fee**
- **Time and Material**

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WBS Organization



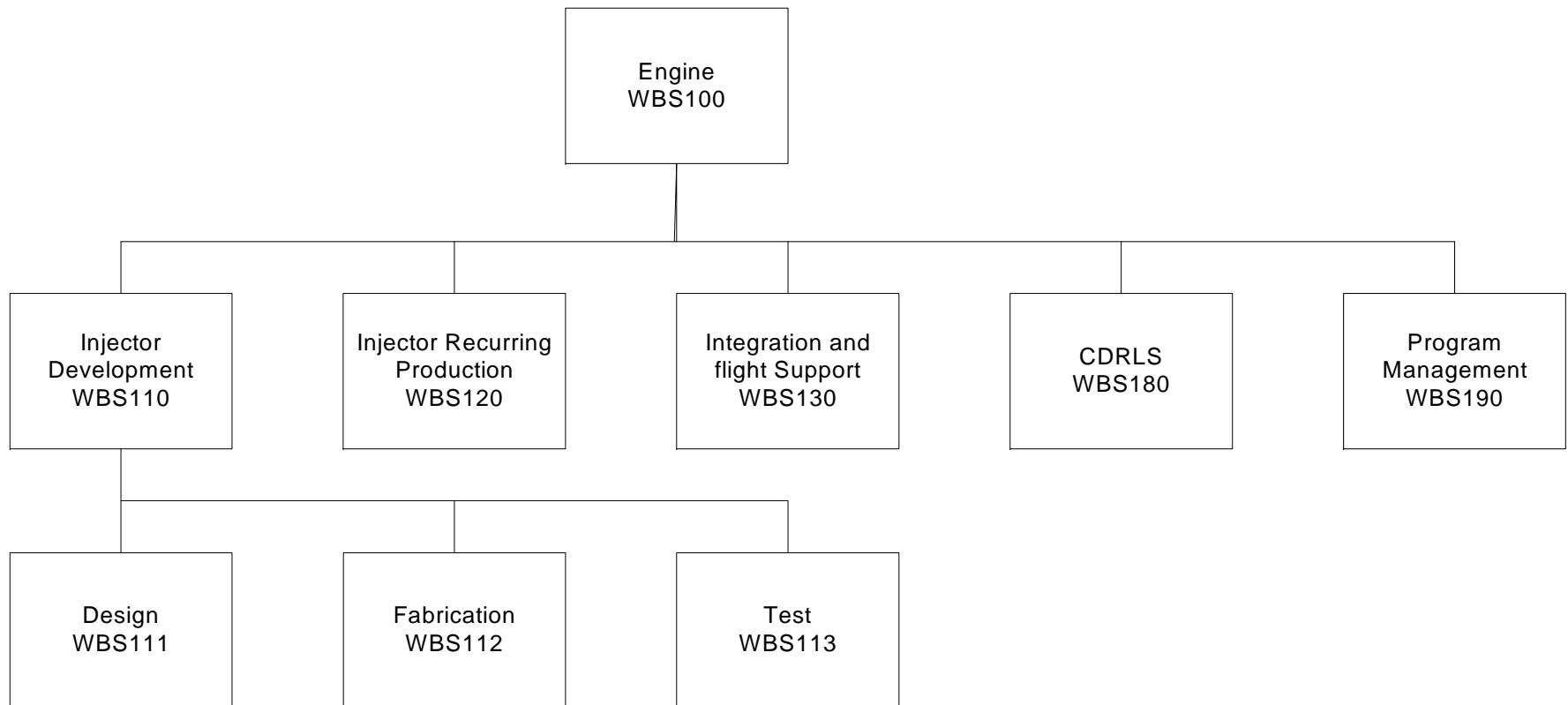
- **WBSs can be based on:**
 - Hardware/software
 - Tasks
 - Schedule, phase or milestones
 - Functional
- **WBSs primarily are used for assuring completeness, cost control, and analysis**
- **Can be any or all of the above or a Standard (Std) WBS methodology**
- **Advantage of a Std WBS is that less effort into Scope Data is required**

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Organization of the Estimate



- The WBS: Is It Std or Variable?

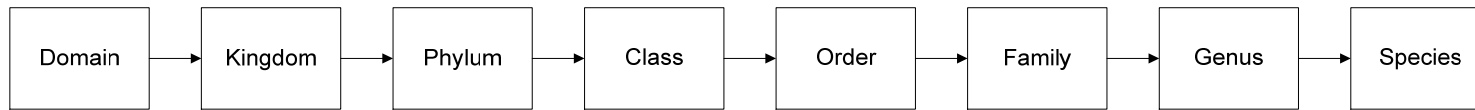


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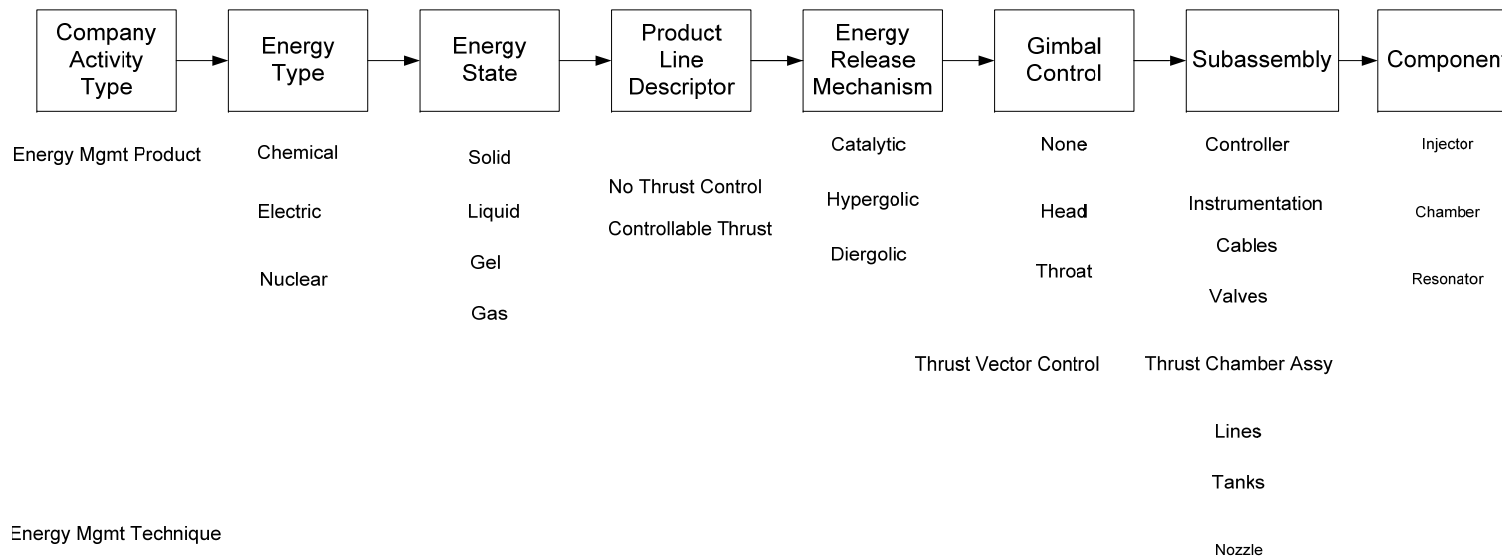
Std WBS Issues



Animal Kingdom Taxonomy

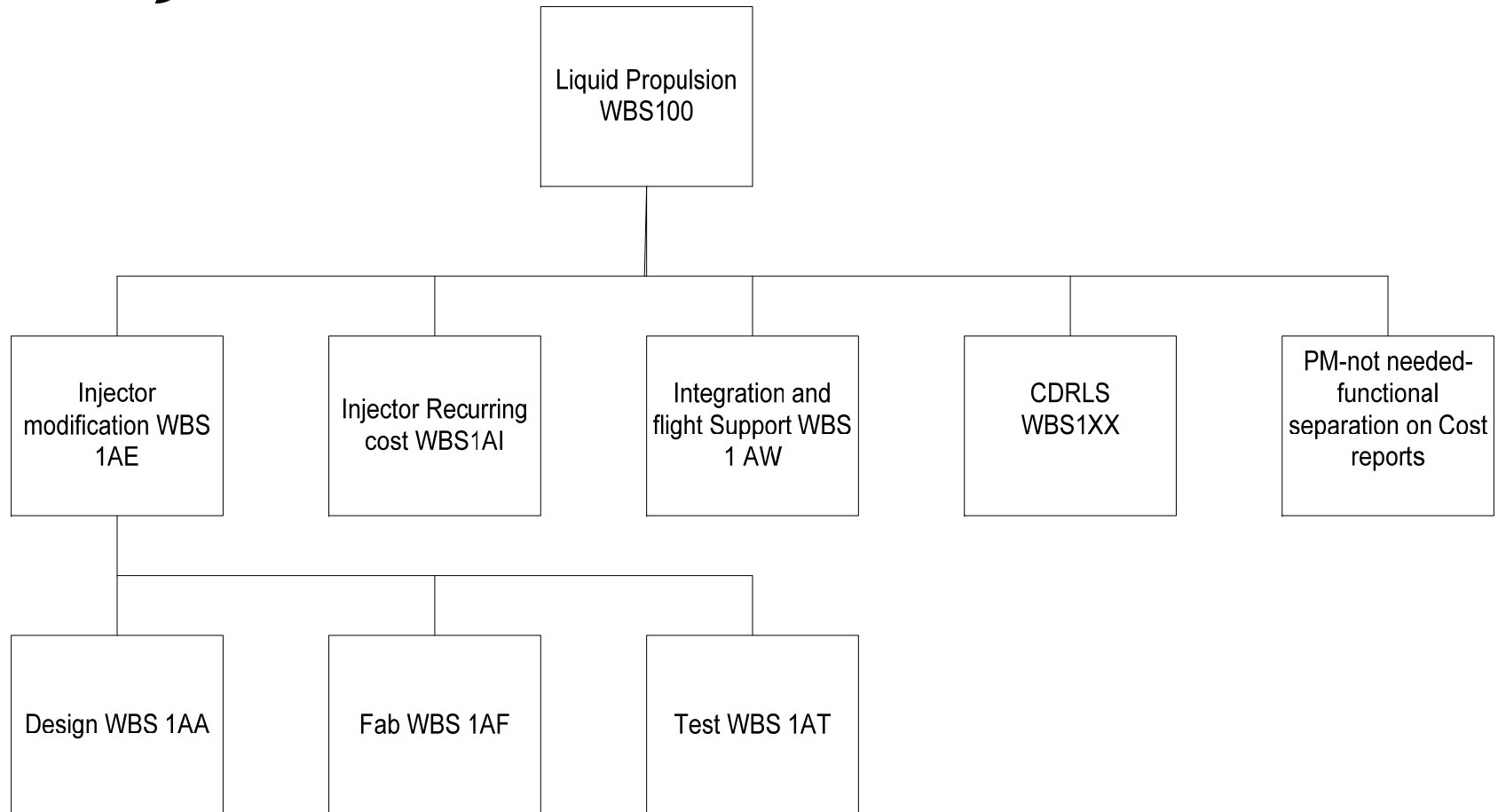


Hardware Kingdom (Rocket Taxonomy)



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Std WBS Example



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Secondary Verification—Should Cost



- **This is a validation methodology and as such it is important that it stands by itself using another technique than the original estimate-if you can come at it from 3 directions.**
- **Go with your first cut for the should cost**
 - No gaming or modifying after you are done
- **Make sure the funding profile isn't the program driver.**

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Std WBS Methodology



- **Benefits include better organization of data into similar scope categories or product lines so normalization is easier**
- **Original taxonomy is important so the Std WBS does not change**

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Be careful of other factors

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- **Make sure the funding profile isn't the program driver. If it doesn't match your funding it can skew the data.**
- **Oversight caused by man rating.**
- **If you are using models make sure you anchor them with your data.**
- **Knowing the scope of the previous effort is important-even with models.**
- **If you are going to manage this program-know your team's maturity.**

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Conclusion

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- **The amount of trust you have in the estimate you are looking at is proportional to the detail of the logic and the use of valid math techniques**